Homework 1: Derivatives and Antiderivatives

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Instructions: Legibly complete the following on lined paper. Turn in problems marked "TI" for *possible* grading.

1. Compute the indicated derivatives.

TI (a) $\dfrac{d}{dx}\left[5x^3 - 7\ln(x) + 2x^{-4}\right]$

(b) $\dfrac{d}{dx}\left[\dfrac{x^2 - x^5}{x - \cos(x)}\right]$

TI (c) $\dfrac{d}{dx}\left[e^{7x\cos(x^2)}\right]$

(d) $\dfrac{d}{dy}\left[\dfrac{y\cos(y)}{y\sin(y) - y\cos(y)}\right]$

(e) $\dfrac{d}{dx}\left[(x^2 + 5x)^{-12}\right]$

(f) $\dfrac{d}{dz}\left[z(\cos(z) - e)\right]$

2. Compute the following general antiderivative of each of the following functions.

TI (a) $\displaystyle\int x\exp(x^2 - 1)\,dx$

(b) $\displaystyle\int \cos(x)\sin(x)\,dx$

(c) $\displaystyle\int \sec(x)\tan(x)\,dx$

TI (d) $\displaystyle\int x^5 - x^{-1} + 4x^3\,dx$

(e) $\displaystyle\int x^4\ln(x^5 - 4)\,dx$

TI (f) $\displaystyle\int \frac{2x^3 - x}{(x^4 - x^2)^{23}}\,dx$

TI (g) $\displaystyle\int \frac{\ln(x)}{x}\,dx$

(h) $\displaystyle\int \frac{y^2 + 1}{y^3}\,dy$

3. Approximate the net area between $f(x) = x^2 - x$ and the x-axis on $[-1, 2]$ using left-endpoints with...

(a) $n = 3$ rectangles.

TI (b) $n = 6$ rectangles.

(c) $n = 9$ rectangles.